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EXAMINER

HAGAN, SEAN P

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/816,026	Applicant(s) XU ET AL.	
	Examiner SEAN HAGAN	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 14-17, 19, 20 and 25-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 18, 21-24, 32 and 33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1 through 33 originally filed 31 March 2004. Claims 1 through 13, 18, 21 through 24, 32, and 33 elected for examination in response received 19 March 2009. Claims 1 through 33 are pending in this application. Claims 1 through 13, 18, 21 through 24, 32, and 33 are addressed in this action.

Response to Arguments

2. Applicant's arguments have been fully considered; they are not persuasive.

3. Applicants argue that claim 9 is not anticipated by Kim (US Pub. 2001/0021051) because Kim fails to teach a bias mode adjustable by a bias control of the laser driver or a modulation mode adjustable by a modulation control. The present claims fail to identify that these controls are necessarily separately processed. In the case of Kim, the cited paragraph is related to processing of a current signal for error correction which also cited p. [0054], lines 5-8 of Kim notes includes changes to the magnitude of modulation current or bias current. As such, this feature is taught by Kim.

4. Examiner notes that claims are allowable or rejected as a whole, not as individual parts. While a claim limitation may be directly connected to a citation; the actual rejection relies on all citations noted as well as the context therein and all inherent aspects required for the citations.

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5. Applicants argue that Chun et al. (Chun, US Patent 6,294,933) fails to disclose the generation of a differential signal from complimentary coupling of two single-ended voltage signals. On the contrary, the cited portion shows Chun doing this twice, first to generate OUTA and second to generate OUTB. Both signals are generated from the complimentary coupling of single ended voltage signals. As such, this feature is taught by Chun.

6. Applicants argue that Kim (as well as Chun) fail to disclose "A first transimpedance amplifier circuit to convert the first current signal to a first differential voltage signal" because neither reference explicitly uses a transimpedance amplifier circuit. While this is true, the cited portion of Kim discloses the conversion of a current signal to a voltage signal and does not make requirements on the specific circuitry involved. Examiner must note that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this instant case, it is notable that transimpedance amplifiers are well known devices used for the purpose of converting a current signal into a differential signal and it would have been obvious to one of ordinary skill in the art, posed with the requirement that this be performed by Kim, to employ such a device.

7. Applicant argues that Chun does not process an aligned clock signal with a differential voltage to generate a digital voltage sequence. Figure 1 of Chun shows clock signal 106 being processed with differential signal 125a to generate digital voltage sequence 142. As such, this feature is taught by Chun.

8. Applicants argue that Kim fails to disclose a sampler circuit to generate a second digital voltage sequence responsive at least in part to an aligned clock signal and a first differential voltage signal. It is examiner's interpretation that the various clock signals of Kim, which are generated from one another, fulfill the requirements made upon the "aligned clock signal" as well as the first and second "digital voltage sequences". As such, Kim provides a sufficient number of clock signals to read upon this requirement and this feature is taught by Kim.

9. As such, all claims are addressed as previously stated, reprised as follows:

Claim Rejections - 35 USC § 102

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. Claim 9 rejected under 35 U.S.C. 102(b) as being anticipated by Kim (US Pub. 2001/0021051).

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12. **Regarding claim 9**, Kim discloses, "A phase locked loop circuit to generate a clock signal" (p. [0049]). "A serializer circuit to receive the clock signal and to convert an N-bit data to a digital voltage sequence" (p. [0019]). "A laser driver having a bias control and a modulation control" (p. [0054], lines 5-8). "Said laser driver to receive the digital voltage sequence and to generate a current signal having a bias mode adjustable by said bias control and a modulation mode adjustable by said modulation control" (p. [0019]). "A laser to generate an optical signal responsive to the current signal of the laser driver" (Fig. 2, pt. 180).

Claim Rejections - 35 USC § 103

13. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

14. Claims 1, 2, 3, 4, 5, 6, 7, 8, 18, 21, 22, 23, 32, and 33 rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Chun et al. (Chun, US Patent 6,294,933).

15. **Regarding claim 1**, Kim discloses, "Serializing an N-bit data to generate a digital voltage sequence" (p. [0019]). "Converting the digital voltage sequence to a first current signal having an adjustable bias mode and an adjustable modulation mode" (p. [0054], lines 5-8). "Driving a first laser using said first current signal to generate a first optical signal transmission" (p. [0019]). "Converting a second optical signal reception into a first single-ended voltage signal" (p. [0053]). Kim does not disclose, "Complimentary

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coupling said first single-ended voltage signal with a second single-ended voltage signal to generated a differential data voltage signal." "Resistively coupling said first and second single-ended voltage signals to attenuate a common signal noise." Chun discloses, "Complimentary coupling said first single-ended voltage signal with a second single-ended voltage signal to generated a differential data voltage signal" (col. 3, lines 28-38). "Resistively coupling said first and second single-ended voltage signals to attenuate a common signal noise" (col. 6, lines 20-24). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Kim with the teachings of Chun. Clock recovery as detailed in Chun would enhance the teachings of Kim by reducing the effect of noise. (Chun, col. 6, lines 20-24)

16. **Regarding claim 2**, Kim discloses, "Generating a digital clock signal" (p. [0049]). "Using the digital clock signal to generate the digital voltage sequence from the N-bit data" (Fig. 11, pt. 176). "Converting the digital clock signal to a second current signal having an adjustable bias mode and an adjustable modulation mode" (p. [0054], lines 5-8). "Driving a second laser using said second current signal to generate a third optical signal transmission" (Fig. 11, pt. 180e).

17. **Regarding claim 3**, Kim discloses, "Adjusting said modulation mode of the second current signal" (p. [0054]).

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18. **Regarding claim 4**, Kim discloses, "Adjusting said bias mode of the second current signal" (p. [0054]).

19. **Regarding claim 5**, Kim discloses, "Converting the third optical signal reception into a third single-ended voltage signal" (p. [0058]). Kim does not disclose, "Complimentary coupling said third single-ended voltage signal with a fourth single-ended voltage signal to generate a differential clock signal." "Recovering the digital clock signal from the differential clock signal." Chun discloses, "Complimentary coupling said third single-ended voltage signal with a fourth single-ended voltage signal to generate a differential clock signal" (col. 3, lines 28-38). "Recovering the digital clock signal from the differential clock signal" (col. 3, lines 17-21). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Kim with the teachings of Chun for the reasons provided above regarding claim 1.

20. **Regarding claim 6**, Kim discloses, "Generating a plurality of clock phases from the differential clock signal in a delay locked loop" (p. [0073]). "Interpolating the plurality of clock phases to align a clock edge of the digital clock signal with respect to the differential data voltage signal" (p. [0067]).

21. **Regarding claim 7**, Kim discloses, "Adjusting said modulation mode of the first current signal by setting one or more modulation control inputs" (p. [0054]).

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22. **Regarding claim 8**, Kim discloses, "Adjusting said bias mode of the first current signal by setting one or more bias control inputs" (p. [0054]).

23. **Regarding claim 18**, Kim discloses, "A first photo-detector to receive a first optical signal and to generate a first current signal" (p. [0058]). "A first transimpedance amplifier circuit to convert the first current signal to a first differential voltage signal" (p. [0058]). "A clock recovery circuit having a phase interpolator to generate an aligned clock signal for said first differential voltage signal" (p. [0067]). "A deserializer circuit to receive the digital voltage sequence and to generate an N-bit data" (p. [0058]). Kim does not disclose, "A sampler circuit to receive the aligned clock signal and to receive the differential voltage signal and to generate a digital voltage sequence." Chun discloses, "A sampler circuit to receive the aligned clock signal and to receive the differential voltage signal and to generate a digital voltage sequence" (col. 3, lines 28-38). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Kim with the teachings of Chun for the reasons provided above regarding claim 1.

24. **Regarding claim 21**, the combination of Kim and Chun does not disclose, "A second photo-detector to receive a second optical signal and to generate a second current signal." "A second transimpedance amplifier circuit to convert the second current signal to a differential clock signal." "Said clock recovery circuit having said phase interpolator to generate the aligned clock signal for said first differential voltage

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signal from the differential clock signal." It would have been obvious to one of ordinary skill in the art to duplicate the clock transmission means detailed in Kim so as to accomplish the clock processing means detailed by Chun, since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

25. **Regarding claim 22**, Kim discloses, "A delay locked loop to generate a plurality of clock phases from the differential clock signal" (p. [0073]). "Said phase interpolator to generate the aligned clock signal from the plurality of clock phases" (p. [0067]).

26. **Regarding claim 23**, Kim discloses, "A laser driver having a bias control and a modulation control" (p. [0054], lines 5-8). "Said laser driver to receive a first digital voltage sequence and to generate a first current signal having a bias mode adjustable by said bias control and a modulation mode adjustable by said modulation control" (p. [0019]). "A laser to generate a first optical signal responsive to the first current signal of the laser driver" (p. [0019]). "A first photo-detector to receive a second optical signal and to generate a second current signal" (p. [0058]). "A clock recovery circuit having a phase interpolator to generate an aligned clock signal for said first differential voltage signal" (p. [0067]). "A sampler circuit to generate a second digital voltage sequence responsive at least in part to the aligned clock signal and the first differential voltage signal" (p. [0073]). Kim does not disclose, "A first transimpedance amplifier circuit to convert the second current signal to a first differential voltage signal." Chun discloses,

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"A first transimpedance amplifier circuit to convert the second current signal to a first differential voltage signal" (col. 3, lines 28-38). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Kim with the teachings of Chun for the reasons provided above regarding claim 1.

27. **Regarding claim 32**, the combination of Kim and Chun does not disclose, "A second photo-detector to receive a third optical signal and to generate a third current signal." "A second transimpedance amplifier circuit to convert the third current signal to a differential clock signal." "Said clock recovery circuit having said phase interpolator to generate the aligned clock signal for said first differential voltage signal from the differential clock signal." It would have been obvious to one of ordinary skill in the art to duplicate the clock transmission means detailed in Kim so as to accomplish the clock processing means detailed by Chun, since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

28. **Regarding claim 33**, Kim discloses, "A delay locked loop to generate a plurality of clock phases from the differential clock signal" (p. [0073]). "Said phase interpolator to generate the aligned clock signal from the plurality of clock phases" (p. [0067]).

29. Claims 10 and 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Bosch et al. (Bosch, US Patent 6,130,562).

30. **Regarding claim 10**, Kim does not disclose, "A buffered level shifter circuit tunable through $k+1$ control signals to shift an input of the laser driver to a controlled voltage level at a controlled rate and with adjustable impedance responsive to a transition of said digital voltage sequence." Bosch discloses, "A buffered level shifter circuit tunable through $k+1$ control signals to shift an input of the laser driver to a controlled voltage level at a controlled rate and with adjustable impedance responsive to a transition of said digital voltage sequence" (Fig. 2). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Kim with the teachings of Bosch. A level shifter as provided by Bosch would enhance the teachings of Kim by providing a means to digitally control the level of modulation.

31. **Regarding claim 13**, the combination of Kim and Bosch does not disclose, "A plurality of capacitors coupled with the bias control to reduce a frequency dependent component of impedance." It would have been obvious to one of ordinary skill in the art to provide a capacitor bank to provide a low resistance means to achieve high capacitance, since it was known in the art that parallel capacitors have a total capacitance equal to the sum of the constituent components while the reciprocal of total resistance equals the sum of the reciprocals of the constituent components.

32. Claims 11 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Bosch and further in view of Tsai (US Patent 6,735,228).

33. **Regarding claim 11**, the combination of Kim and Bosch does not disclose, "A CMOS modulation circuit having a pMOSFET, a first nMOSFET and a second nMOSFET." "The CMOS modulation circuit to cause the current signal of the modulation mode to flow from a laser power source through the first nMOSFET and second nMOSFET responsive to the input of the laser driver being shifted to a first voltage level." "To causes the current signal of the bias mode to flow from the laser power source through the bias control when another current flows from a second power source through the pMOSFET responsive to the input of the laser driver being shifted to a second voltage level." Tsai discloses, "A CMOS modulation circuit having a pMOSFET, a first nMOSFET and a second nMOSFET" (Fig. 4, pts. 430, 420, and Q507). "The CMOS modulation circuit to cause the current signal of the modulation mode to flow from a laser power source through the first nMOSFET and second nMOSFET responsive to the input of the laser driver being shifted to a first voltage level" (Fig. 3a). "To causes the current signal of the bias mode to flow from the laser power source through the bias control when another current flows from a second power source through the pMOSFET responsive to the input of the laser driver being shifted to a second voltage level" (Fig. 3a). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the combination of Kim and Bosch with the teachings of Tsai. The driving circuit of Tsai would have been suitable for use with the teachings of Kim and Bosch. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of

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obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

34. **Regarding claim 12**, the combination of Kim and Bosch does not disclose, "An input gate of the third nMOSFET is coupled with the second power source to reduce an overshoot of the current signal." Tsai discloses, "An input gate of the third nMOSFET is coupled with the second power source to reduce an overshoot of the current signal" (Fig. 4, pt. Q508). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the combination of Kim and Bosch with the teachings of Tsai for the reasons provided above regarding claim 11.

35. Claim 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Chun and further in view of Bosch.

36. **Regarding claim 24**, the combination of Kim and Chun does not disclose, "A tunable buffered level shifter to shift an input of the laser driver to a controlled voltage level responsive to a transition of said first digital voltage sequence." Bosch discloses, "A tunable buffered level shifter to shift an input of the laser driver to a controlled voltage level responsive to a transition of said first digital voltage sequence" (Fig. 2). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the combination of Kim and Chun with the teachings of Bosch. A level

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shifter as provided by Bosch would enhance the teachings of Kim and Chun by providing a means to digitally control the level of modulation.

Conclusion

37. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

38. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

39. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN HAGAN whose telephone number is (571)270-1242. The examiner can normally be reached on Monday-Friday 7:30 - 5:00.

40. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun O. Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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41. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. H./

Examiner, Art Unit 2828

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828